
Psychrophiles
deep freeze
life in the extremes
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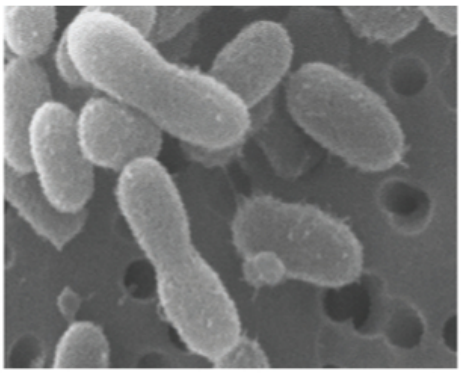

Chryseobacterium greenlandensis is an ultra-small bacterium that has survived for up to 120,000 years within the ice of a Greenland glacier, nearly two miles down.

EXTREME ABILITY Most true psychrophiles require temperatures below -4 °F to survive. To protect their DNA, some species produce special proteins that act as anti-freezing agents. Other species have evolved cell layers that resist stiffening in the cold.

EXTREME ENVIRONMENTS Psychrophiles can be found in Arctic soils, deep ocean water, glaciers, snowfields, sea ice, and tundra. Scientists are trying to determine if Jupiter's icy moon Europa is home to cold-loving microbes.

EXTREME EXAMPLES These microbes can cause widespread crop disease. *Leifsonia* sp., for example, are especially destructive bacteria that have caused enormous amounts of damage to sugarcane crops.

Photo Credit: Perito Moreno Glacier, Argentina - Luca Galuzzi (front); *Chryseobacterium greenlandensis* - Penn State (back). For more information visit http://astrobiology.nasa.gov/